

VHD

VERY HIGH DEFINITION

VHD 2000

OPERATOR'S MANUAL



VHD - Active Driven, Vertically Arrayable, Long Throw,
Wide Dispersion Speaker System

IMPORTANT SAFETY INSTRUCTIONS

Before using your VHD 2000, be sure to carefully read the applicable items of these operating instructions and the safety suggestions

1. Keep this manual for future reference.
2. Heed all warnings.
3. Follow all instructions.
4. Do not use this unit near water. Do not spill water or other liquids into or on the unit. Do not operate the VHD 2000 while wet or standing in liquid.
5. Clean only with dry cloth.
6. Do not block the air intake or exhaust ports. Install the unit in accordance with the instructions.
7. Do not operate the VHD 2000 near heat producing devices such as radiators, heat registers, stoves or other apparatus that produce heat.
8. Always operate the unit with the chassis ground wire connected to the electrical safety earth. Do not defeat the safety purpose of a grounding-type plug. A grounding type plug has two pins and a third grounding prong. The third prong is provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
9. Connect only to AC power outlets rated 115-250V, 50-60Hz.
10. Do not use this VHD 2000 if the power cable is broken or frayed. Protect the power cable from being walked upon or pinched particularly at the plugs and the point where it exits from the apparatus.
11. Only use accessories specified by the manufacturer.
12. The unit is intended to be used in a 19" rack. Follow the mounting instructions. When a rack on wheels is used, use caution when moving the loaded rack to avoid injury from tipping over.
13. Unplug this apparatus during lightning storms or when unused for long periods of time.
14. Do not connect a VHD 2000 output in parallel or series with any other VHD 2000's output. Do not connect the VHD 2000 output to any other voltage source, such as battery, mains source, or power supply, regardless of whether the VHD 2000 is turned on or off.
15. Do not run the output of any VHD 2000 back into another channel's input.
16. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way such as:
 - Power-supply cord or plug is damaged
 - Liquid has been spilled into the unit
 - An object has fallen into the unit
 - The unit has been exposed to rain or moisture
 - The unit does not operate normally
 - The unit was dropped or the enclosure is damaged
17. Do not remove top or bottom covers. Removal of the cover will expose hazardous voltages. There are no serviceable parts inside and removal may void the warranty.
18. An experienced user shall always supervise this professional audio equipment, especially if inexperienced adults or minors are using the equipment.

CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE THE COVER. NO USER-SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED PERSONNEL.

WARNING: To prevent fire or electric shock, do not expose this equipment to rain or moisture.

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INTRODUCTION

Thank you for purchasing this KV2 Audio VHD 2000 amplifier control unit. This manual contains important information on operating this unit correctly and safely. Please take some time and read this manual to familiarise yourself with the advanced features of this unit.

The VHD 2000 is the amplifier control unit for processing and powering one VHD 2.0 mid high enclosure. It also houses all processing and control electronics for the associated VHD subwoofer systems.

The VHD 2000 is a three-way, rack-mounted unit containing high frequency, mid frequency and mid-bass amplifiers. The unit features Class AB mosfet amplifiers for the high frequencies, with transformer-balanced outputs, and Class H mosfet amplifiers for the mid frequencies. The mid-bass amplifier is a new version of KV2 Audio's high efficiency, analogue switch-mode amplifier delivering 1200 Watts.

The VHD 2000 is the world's first loudspeaker control system with proprietary digital signal delay technology using direct stream digital components providing a 6 MHz sampling rate. The unit provides complete audio system control including equalisation, overdrive protection, thermal protection and user adjustable set up parameters. Once the set-up process is completed, the VHD 2000 manages all system functions and assures optimal performance.

The VHD 2000 is "Line Driver Ready" and has its own input impedance selector on the front panel to accurately match up the input impedance to the output of any mixer used. In most cases it would be advisable to use a VHD LD4 line driver in addition at the mixer end to ensure that the line to the amplifier is driven correctly and the signal integrity maintained.

Additional features include an electronic Tilt function which will electronically tilt the VHD 2.0 Mid high cabinet down by 10 degrees. This is particularly useful where the physical placement of the boxes is restricted relative to the intended area of coverage.

Although this unit is simple to operate improper use can be dangerous. This is a very high-powered device that can put out high voltages and sizeable currents. Always use safe operating techniques with the VHD 2000.

FOR YOUR SAFETY, READ THE IMPORTANT PRECAUTIONS SECTION AS WELL AS THE INPUT, OUTPUT AND POWER CONNECTION SECTIONS OF THIS MANUAL.

GETTING STARTED

2.1 UNPACKING

Unpack the VHD 2000 and check to see if there is any damage to it. If you find any damage notify your supplier immediately. Only the consignee may institute a claim with the carrier for damage incurred during shipping. Be sure to save the carton and all packing materials for the carrier's inspection.

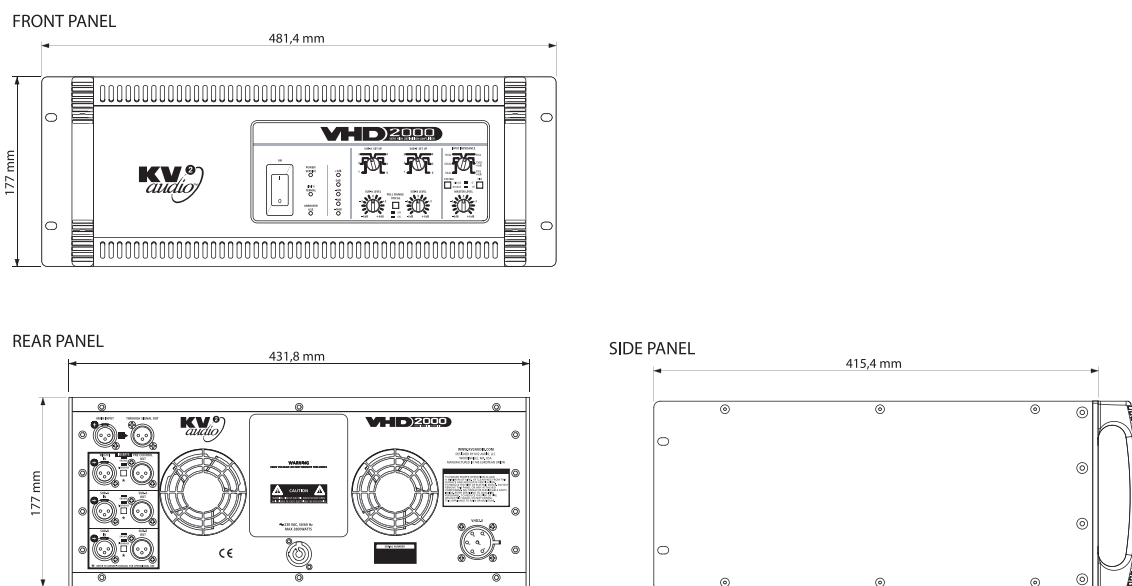
Should you ever need to ship the unit, only use the original factory packaging. If the shipping carton is unavailable, contact your supplier to obtain a replacement.

The VHD 2000 carton should contain:

- VHD 2000 amplifier control unit
- User's manual
- PowerCon detachable power cable

2.2 RACK MOUNTING

VHD 2000's will mount in standard 19" rack systems. Integral rear mounting rack ears are also provided for additional support, do not rely on fixing and mounting the VHD 2000 using just the front panel as support. Use eight screws and washers to mount the amplifier to the equipment rack rails (four for the front and four for the rear). We recommend using a shock mounted rack for touring use to prolong the life of your VHD 2000.



GETTING STARTED

2.3 COOLING

The VHD 2000 has a comprehensive cooling system featuring chassis-sealed PCB board mounting and shock mounted, speed controlled fans. This means that the cooling system never drives air across PCB boards, connectors or components ensuring prolonged electronic component lifespan and minimizing maintenance cycles.

Air is drawn into the front of the amplifier by the two fans on the rear panel, this passes over the cooling fins of the heat sinks and exhausts through the rear. If the heat sink gets too hot, its sensing circuit will open the output relay, disconnecting the load.

It is important to have an adequate air supply at the front of the amplifier, and enough space around the rear of the amplifier to allow the cooling air to escape. If the unit is rack mounted, do not use doors or covers on the rear of the rack; the exhaust air must flow without restriction. If you are using racks with closed backs, use fans on the rear rack panel to ensure an ample air supply.

2.4 AC REQUIREMENTS

A PowerCon cable is provided to connect the VHD 2000 to a suitable AC power supply.

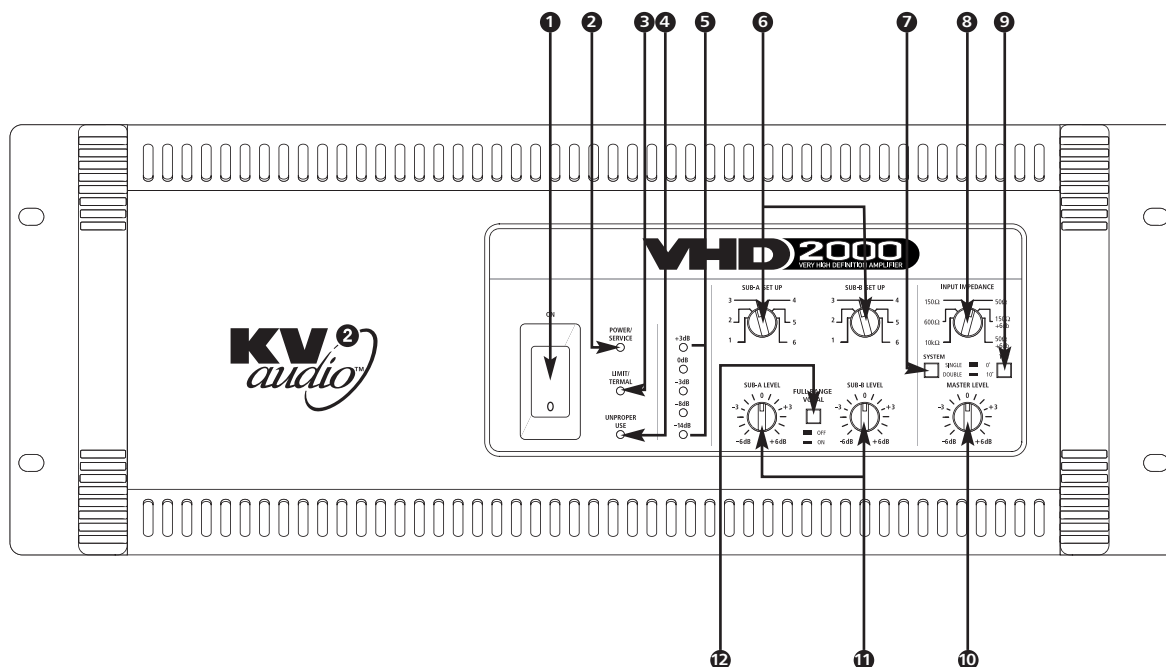
The PowerCon is a connector without breaking capacity, i.e. the PowerCon should not be connected or disconnected under load or while it is live. Always isolate your AC supply before disconnecting the PowerCon connector.

Your VHD 2000 will be supplied pre set to the voltage used in your area. The table below provides typical current draw figures for the VHD 2000.

AC Input	Current draw with amplifier running at Average Power	Current draw with amplifier running at Peak Power
250V	7.5A	11A
230V	8A	12A
115V	16A	24A

FEATURES

3.1 FRONT PANEL



1) AC Mains Switch

The VHD 2000 has a combination AC Mains switch/circuit breaker on the front panel. If the switch shuts off during normal use, push it back to the ON position once. If it will not stay on you should take the unit to qualified service personnel to have it serviced.

2) Power / Service LED

This is a dual colour LED, when green it indicates that the AC power is on. When red it indicates that there is a fault condition sensed within the VHD 2000 and that the unit needs servicing.

3) Limit / Thermal LED

This is a dual colour LED, when green it indicates that the audio limiter has been activated. When red it indicates that the thermal limit of the VHD 2000 has been exceeded and the unit has shut down because of this.

4) Improper Use LED

If the VHD 2000 is connected improperly then this LED will light and the unit will shut down. An example of this is if a full range signal is applied to the 'Mid/Hi In' rather than the 'Main Input', the VHD 2000 will sense this and shut down to further protect any damage occurring to loudspeakers that are connected to it.

5) Signal LED's

These LED's give visual indication of the level of the input signal applied to the 'Main Input'.

FEATURES

3.1 FRONT PANEL - CONTINUED

6) Sub A & B Set Up

These switches are set according to which combination of subwoofers is being used with the system - see Operation Modes.

7) System Single / Double

This switch sets the controller for use when either a single VHD 2.0 is being used or a double system using 2 VHD 2.0's are being used. In this mode another VHD 2000 would be required to power the second VHD 2.0 and both switches should be set to 'Double'.

8) Input Impedance

This rotary switch sets the Input Impedance of the VHD 2000 to match that of the mixer or other device supplying the audio signal to the VHD 2000's input. This is especially important when driving longer cable runs and it enables the line to be driven correctly without any losses or other interference. Ideally an LD4 line driver should be used. See Using the System.

9) Tilt

This switch when depressed electronically 'tilts' the dispersion of the VHD 2.0 down vertically by 10°. The Tilt switch should only be used when a single VHD 2.0 system is being used.

10) Master Level

This is the master level control for the system and will affect both the VHD 2.0 and the subwoofer outputs.

11) Sub A / B Level

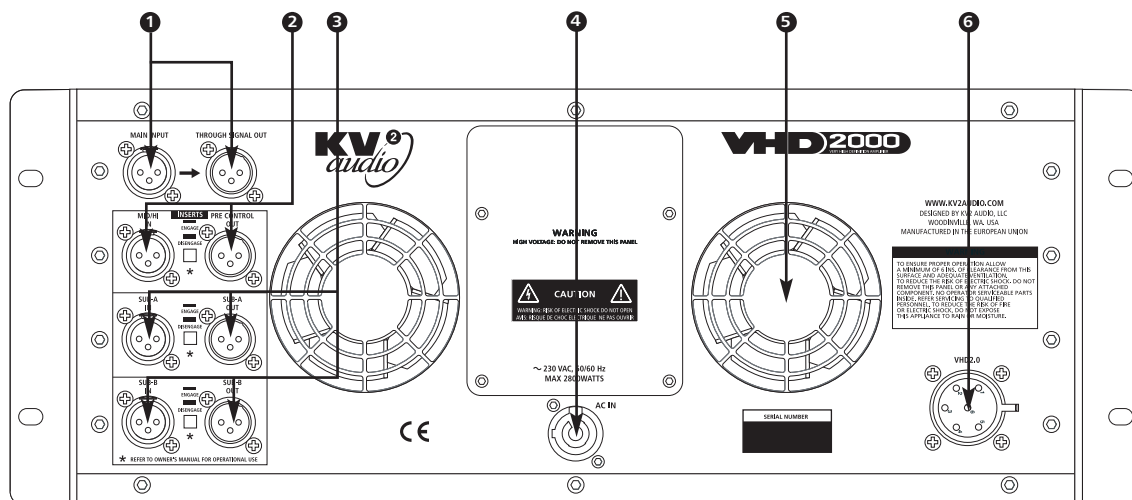
These are the level controls for the Sub A and B outputs; they are 'post' the Master Level control

12) Full Range Vocal

When this switch is activated it enables the VHD 2.0 to be used as a full range system without the need for subwoofers, ideally suited to vocal reproduction and light music applications. The VHD 2.0 will run full range with a 60Hz roll-off added to the system for protection. Note in this mode the subwoofer outputs will be muted to prevent incorrect use of the system.

FEATURES

3.2 REAR PANEL



1) Main Input / Through Signal Out

This is the main system input connector with associated 'Through Signal Output' connector for sending unprocessed signal to other devices, such as more VHD 2000's to power more VHD 2.0's in a system.

2) Mid/High In / Pre Control Out

This is an insert point for the Mid/High section of the VHD 2000, the signal sent to the VHD 2.0 cabinet. It enables you to 'insert' an external device (a delay line for example) into the signal that is being sent to the VHD 2.0. With the associated switch in the 'Engage' setting the Pre Control Out connector would send the signal to the external device, and its output would be returned into the Mid/High In connector.

3) Sub-A In / Sub-A Out , Sub B-In / Sub-B Out

Apart from providing signal processing and power amplification for driving the VHD 2.0 enclosure the VHD 2000 also provides processed outputs for feeding VHD 3200 subwoofer amplifiers to drive various combinations of subwoofers. The signal for this is usually derived from the Main Input on the VHD 2000 but with these Sub In and Sub Out connectors and associated switches the option is available to derive the signal input for the subwoofer section from a different source. For further information see Using the System.

4) PowerCon Power Connector

Accepts a standard PowerCon terminated AC cable.

5) Fans

The cooling fans operate continuously while the VHD 2000 is on. An internal temperature sensor increases the speed of the fans during high temperature conditions. Air enters through the front grille and exits through the rear. Be sure to allow adequate air flow to the front of the rack in which the VHD 2000 is mounted.

6) EP6 Connector

Accepts a standard EP6 terminated loudspeaker cable. We recommend using 2.5mm/core cables, six core for the VHD 2.0 enclosure and four core for the VHD subwoofers EP4 connectors as all four connectors are used, when using a VHD 3200 subwoofer amplifier.

USING THE SYSTEM

4.1 NORMAL SET UP

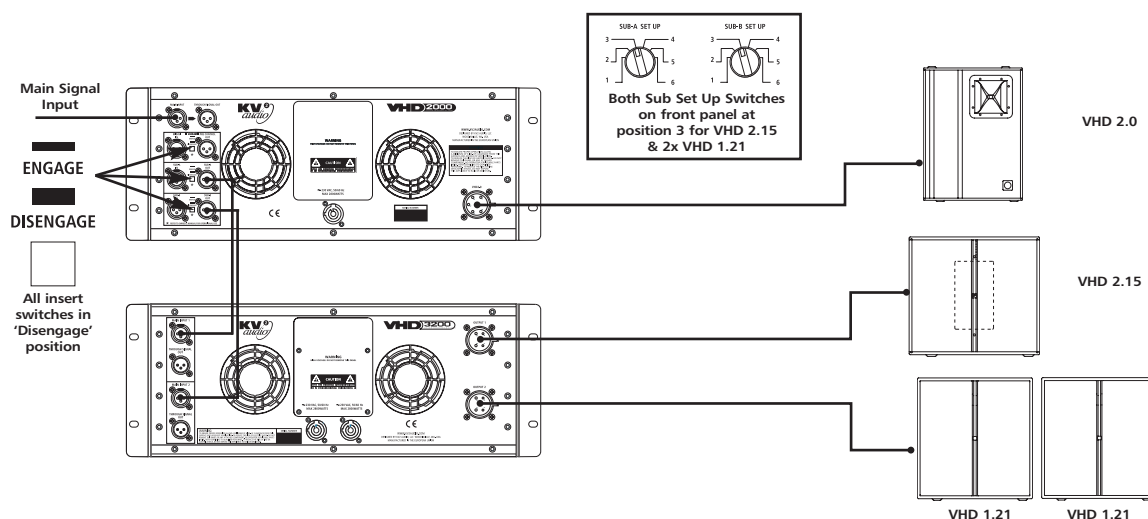
The VHD 2000 is designed to actively power one VHD 2.0 cabinet and to provide signal processing for associated subwoofer systems when used. For Normal Mode operation signal is applied to the 'Main Input' connector and all the 'Insert' switches would be in the 'Disengage' position.

The Input Impedance control should be set to match the output impedance of the device feeding the VHD 2000. If you are using a KV2 Audio LD4 Line Driver then the Input Impedance control on the VHD 2000 should be set to 50Ω. If when using the LD4 you are feeding more than one VHD 2000 then they should all be set to 10kΩ with the last one in the signal chain set to 50Ω. Should you find that once the Input Impedance control has been set there is not enough input signal going into the VHD 2000 (by looking at the Input metering) then there are two settings that give you +6dB extra gain on the input.

Six different combinations of sub woofers are accommodated for when using the VHD 2000. The associated 'Sub-A Set Up' and 'Sub-B Set Up' switches are set according to which combination is being utilised on the Sub-A and Sub-B outputs. Both switches must be set to the same setting. These outputs are then fed from the 'Sub-A Out' and 'Sub-B Out' connectors into VHD 3200 amplifiers that power the subwoofers themselves. The six different combinations are as follows:

Amplifier / Controller Setting	Sub-A Out	Sub-B Out
Setting 1	1 x VHD 2.15	1 x VHD 2.15
Setting 2	2 x VHD 4.18	2 x VHD 4.18
Setting 3	1 x VHD 2.15	2 x VHD 1.21
Setting 4	1 x VHD 2.15	2 x VHD 4.18
Setting 5 (Double System)	2 x VHD 2.15	4 x VHD 4.18
Setting 6 (Double System)	2 x VHD 2.15	4 x VHD 1.21

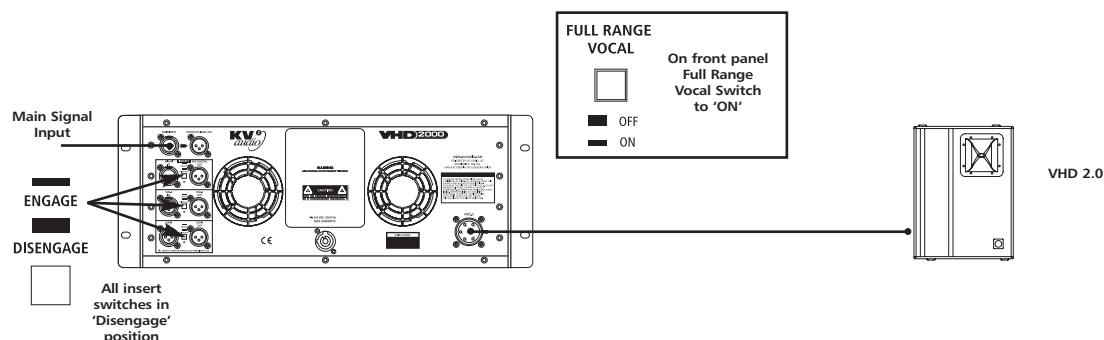
NOTE: Settings 5&6 require 2 x VHD3200 amps



USING THE SYSTEM

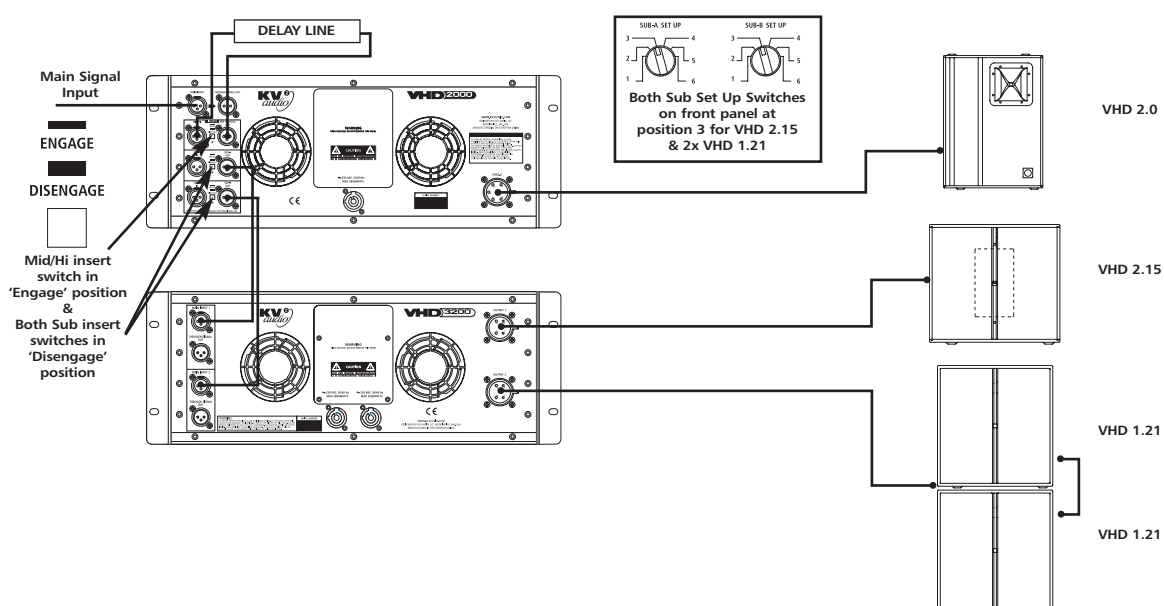
4.2 FULL RANGE VOCAL MODE

If the VHD 2.0 is being used solely for vocal reinforcement & light music playback then the VHD 2000 is used with the associated 'Full Range Vocal' switch depressed. A 60Hz roll-off is added to the system to protect the VHD 2.0. Note: in this mode the subwoofer outputs will be muted to prevent incorrect use of the system.



4.3 USING THE MID/HI INSERT

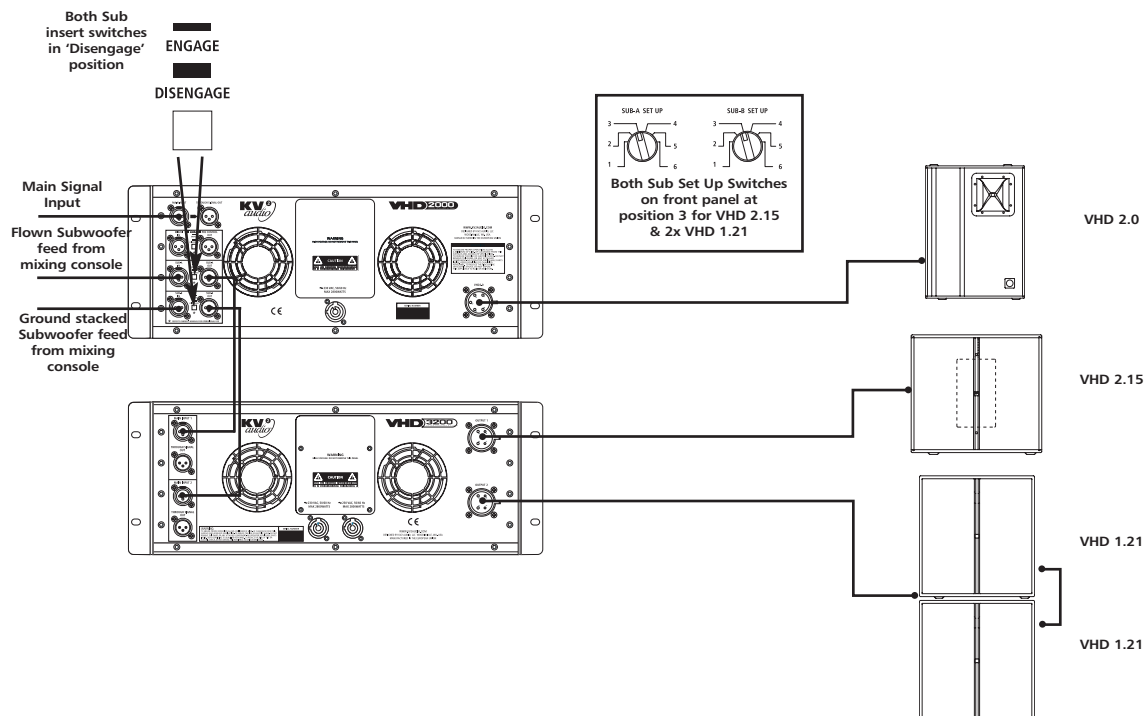
The Mid/Hi Insert point gives you the ability to 'insert' a signal processing device into the mid/hi signal chain. For instance in some instances it may be necessary to 'delay' the signal going to the VHD 2.0 using a delay line. The Main Input is used as the system input, as per Normal Mode, but the Mid/Hi insert switch is switched to 'Engage'. A feed is taken to the delay line from the 'Pre Control Out' connector and the return from the delay line is connected to the 'Mid/Hi In' connector as per the diagram:



USING THE SYSTEM

4.4 FEEDING SUBWOOFERS FROM ANOTHER SOURCE

Taking 'Normal Mode' in Section 4.1 as an example, if the VHD 2.0 was flying you might want to fly the VHD 2.15 above it with the VHD 1.21's ground stacked beneath them. In this instance it would be preferable to have both sets of subwoofers fed by separate feeds from the mixing console, to give you independent level control to each of the subwoofer types, and to have the VHD 2.0 fed by the main output from the mixing console:



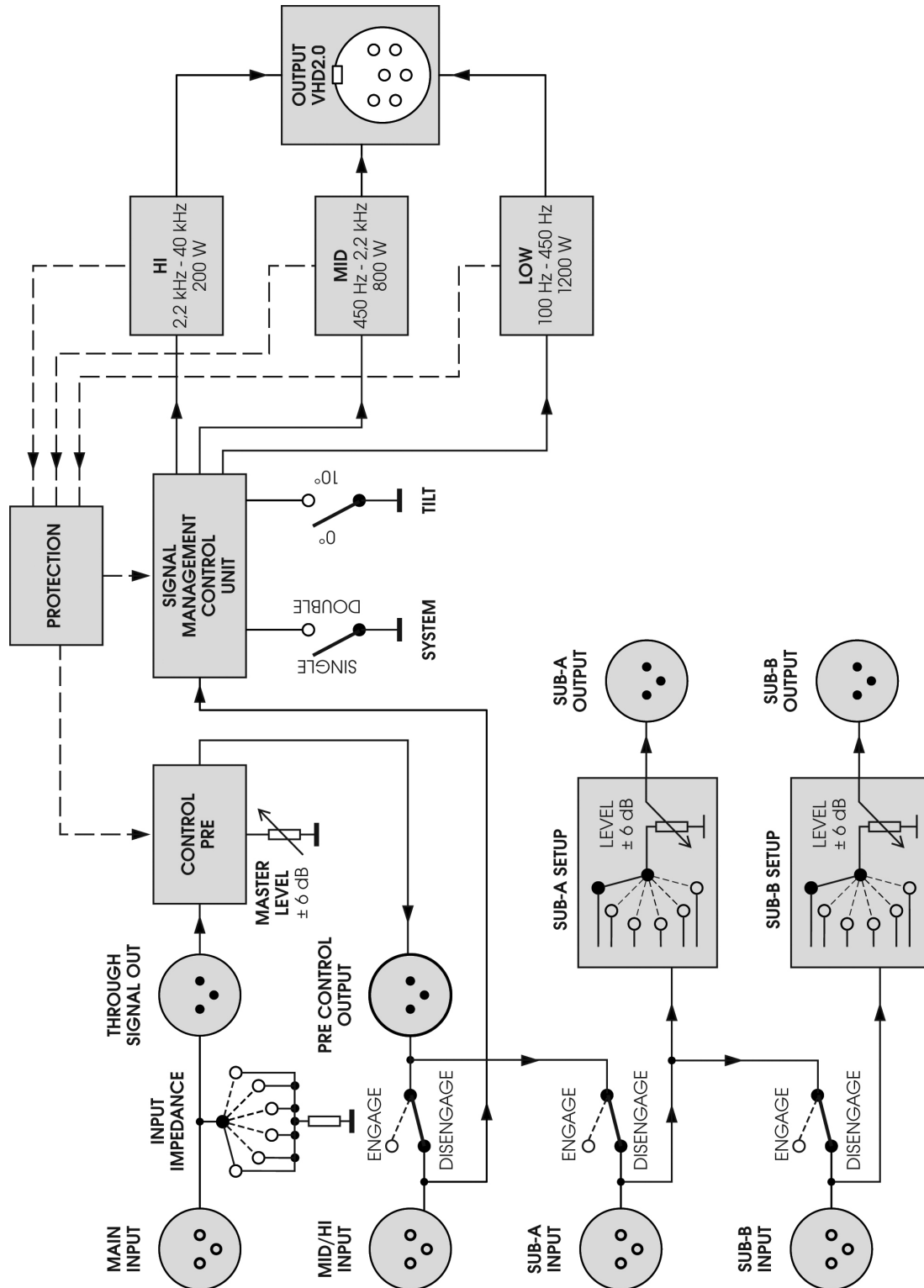
The table below shows the various combinations of the Sub A/B switches and their effect on the signal routing in the VHD 2000:

Sub-A Switch Position	Sub-B Switch Position	Sub-A Out Signal derived from	Sub-B Out Signal derived from
Disengage (Out)	Disengage	Main Input	Main Input
Engage (In)	Disengage	Sub-A In	Sub-A In
Engage	Engage	Sub-A In	Sub-B In
Disengage	Engage	Main Input	Sub-B In

VHD 2000 AMPLIFIER / CONTROLLER SPECIFICATIONS

High Frequency Amplifier	
Type	Class AB - Push Pull - Low IM Design
Rated Continuous Power	200 Watts
Distortion	<.005% THD
Operating Bandwidth	2.5kHz - 20kHz
Mid Frequency Amplifier	
Type	Class H - High Efficiency
Rated Continuous Power	1000 Watts
Distortion	<.005% THD
Operating Bandwidth	500Hz - 2.5kHz
Bass Frequency Amplifier	
Type	High-efficiency, current-enhancing Switch Mode technology with Active Filter
Rated Continuous Power	1200 Watts
Distortion	<.005% THD
Operating Bandwidth	100Hz - 500Hz
Physical	
Height	7.00" (177.8mm)
Width	19.00" (483mm)
Depth	19.5" (495mm)
Weight	70.4 lbs. (32kg)
AC Input Specifications	
AC Connector	Neutrik PowerCon
US	115VAC, 60Hz
US recommended amperage	20 Amps
EU	230VAC, 50Hz
EU recommended amperage	10 Amps
Other	250VAC, 50Hz
Recommended amperage	9 Amps

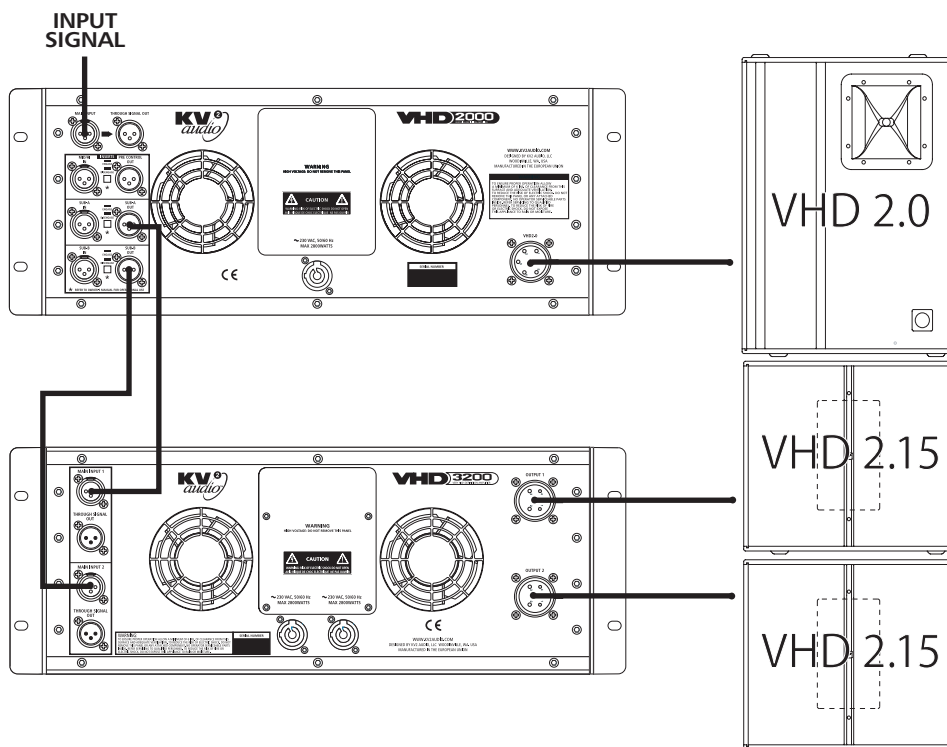
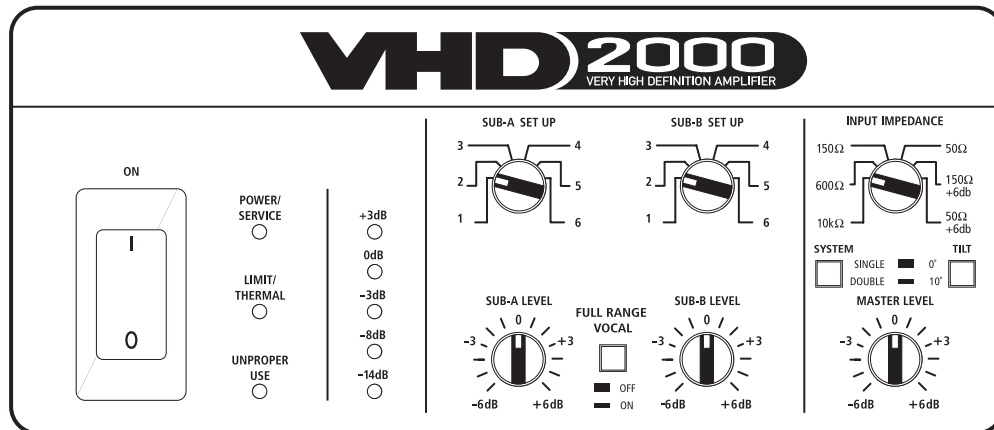
BLOCK DIAGRAM



RECOMMENDED ENCLOSURE COMBINATIONS

SUB SETTING 1

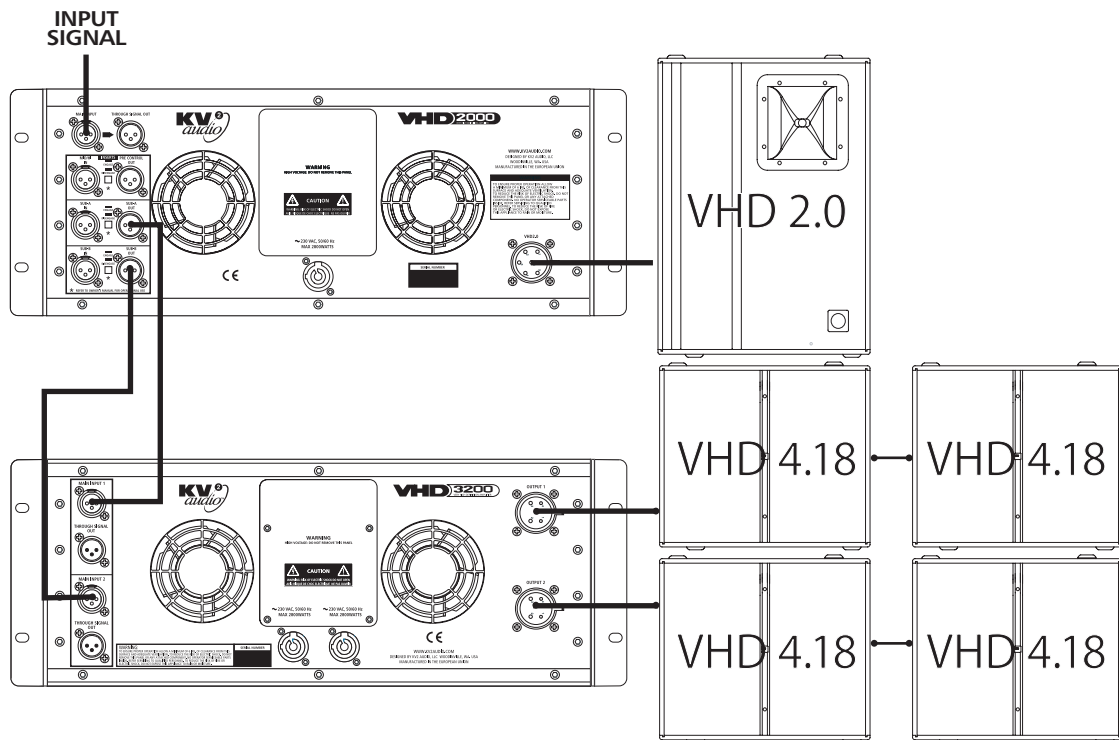
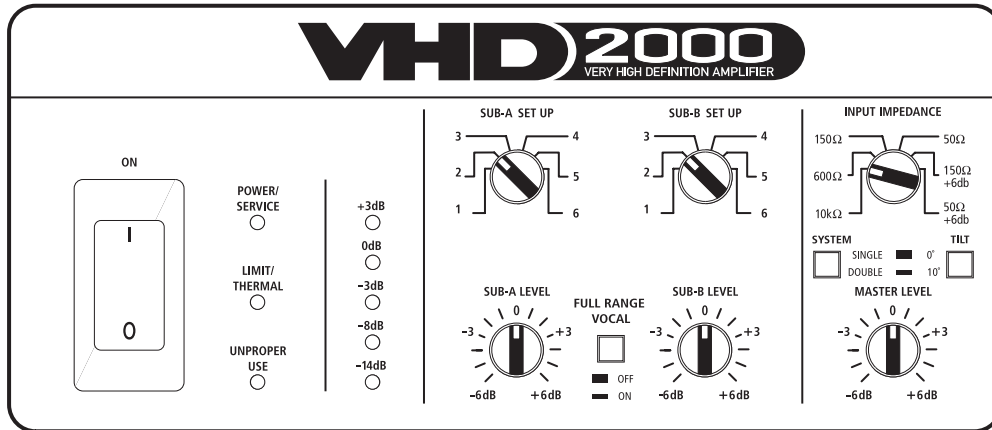
FRONT PANEL VHD 2000 SETUP



RECOMMENDED ENCLOSURE COMBINATIONS

SUB SETTING 2

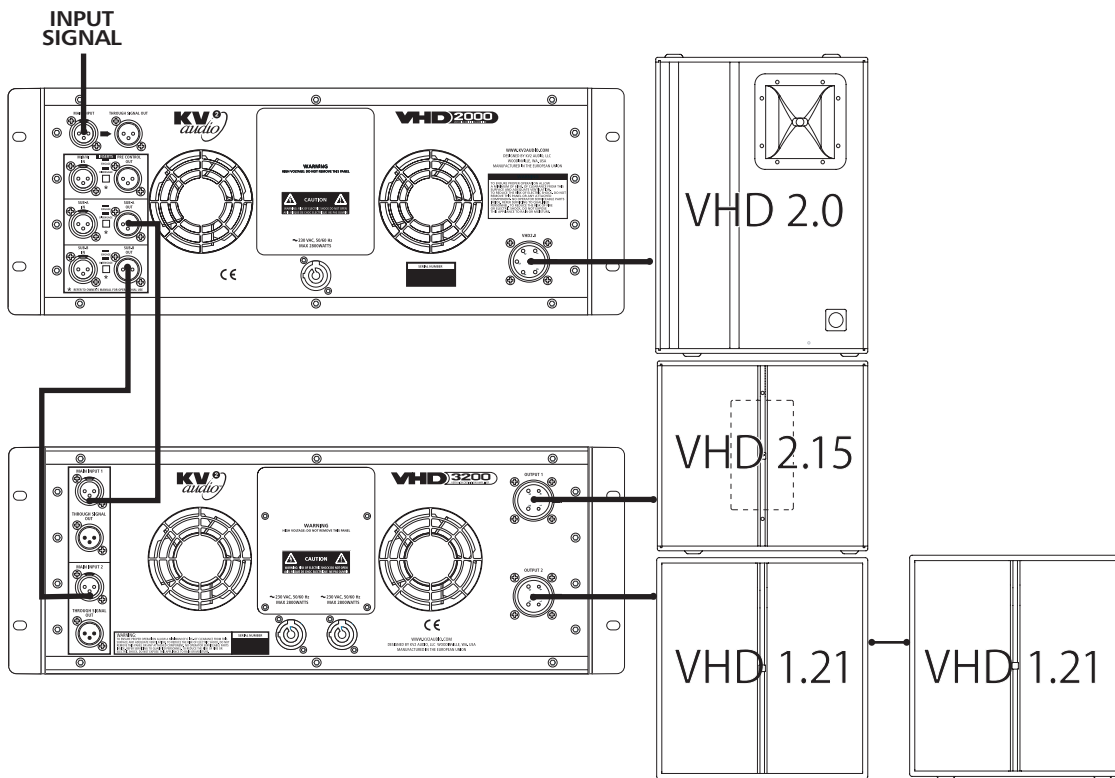
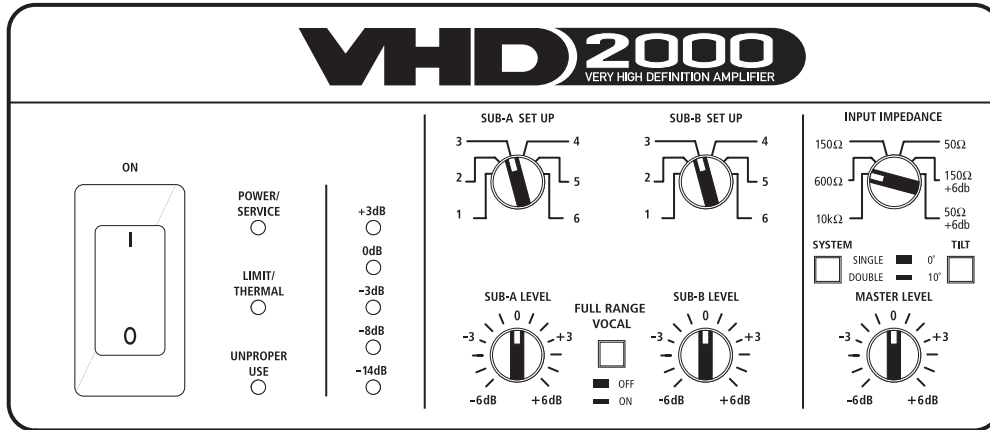
FRONT PANEL VHD 2000 SETUP



RECOMMENDED ENCLOSURE COMBINATIONS

SUB SETTING 3

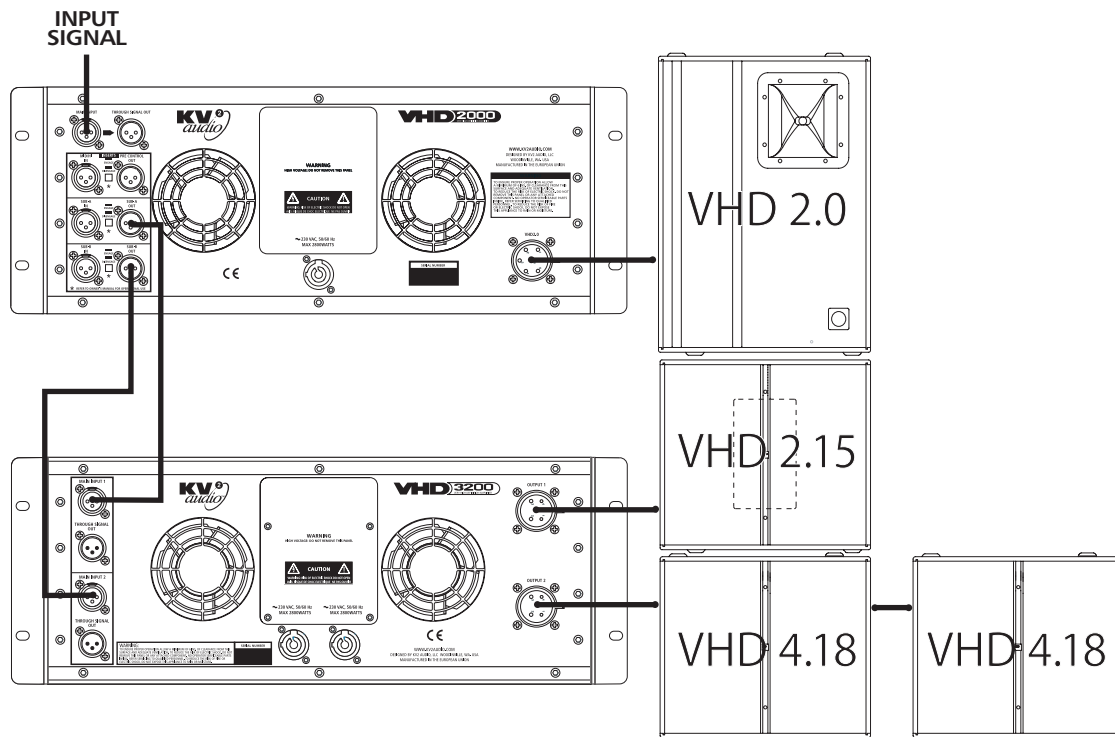
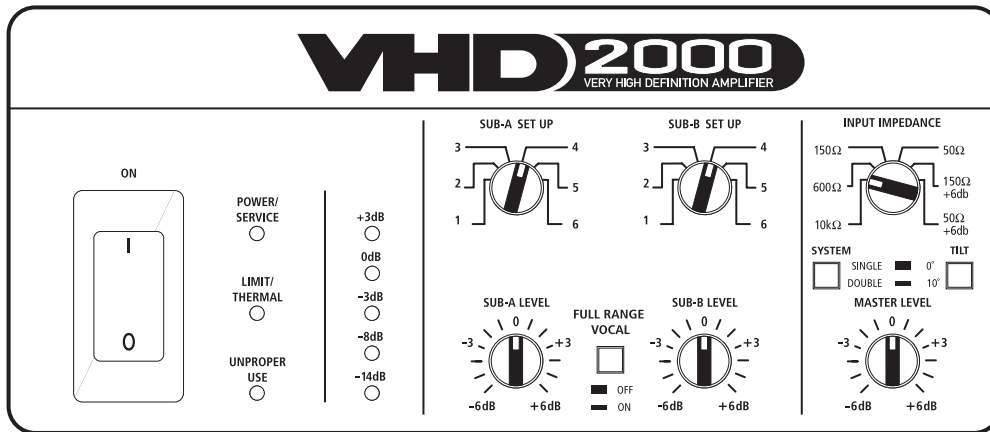
FRONT PANEL VHD 2000 SETUP



RECOMMENDED ENCLOSURE COMBINATIONS

SUB SETTING 4

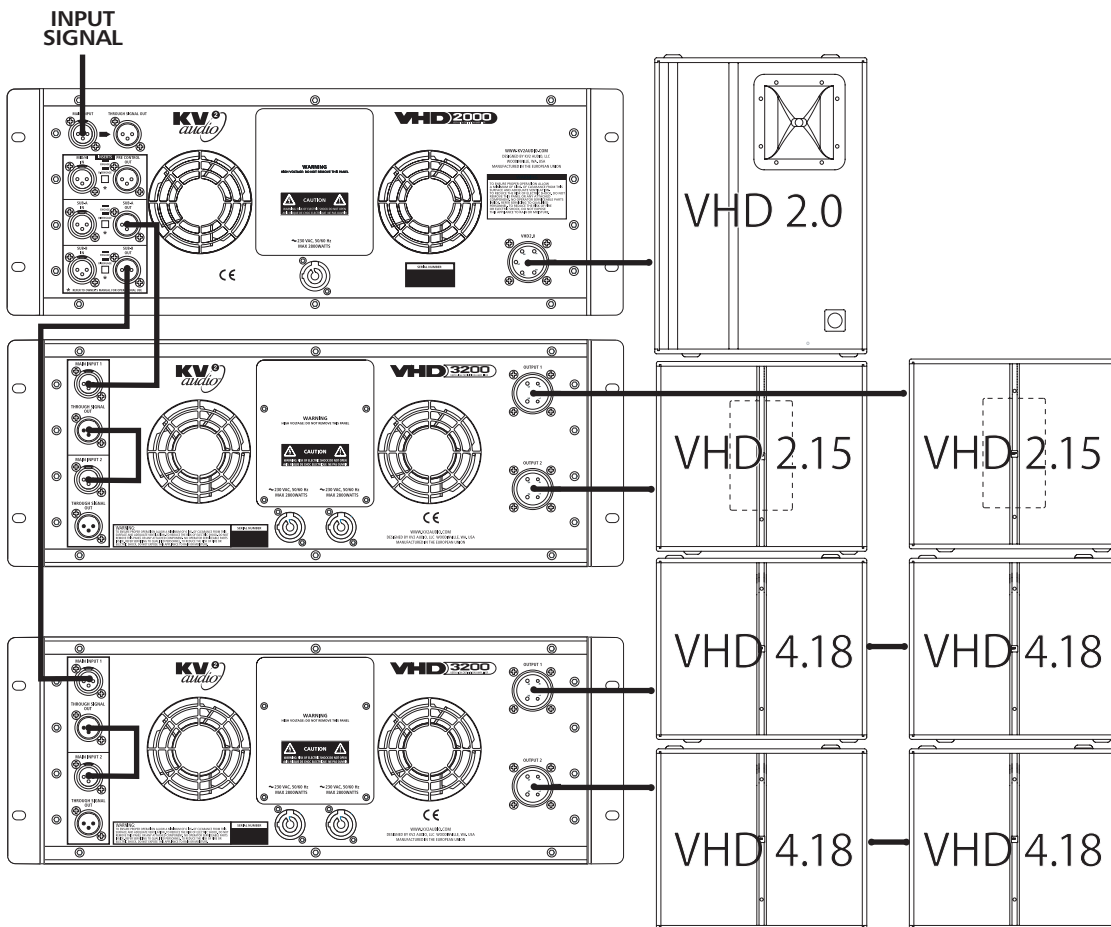
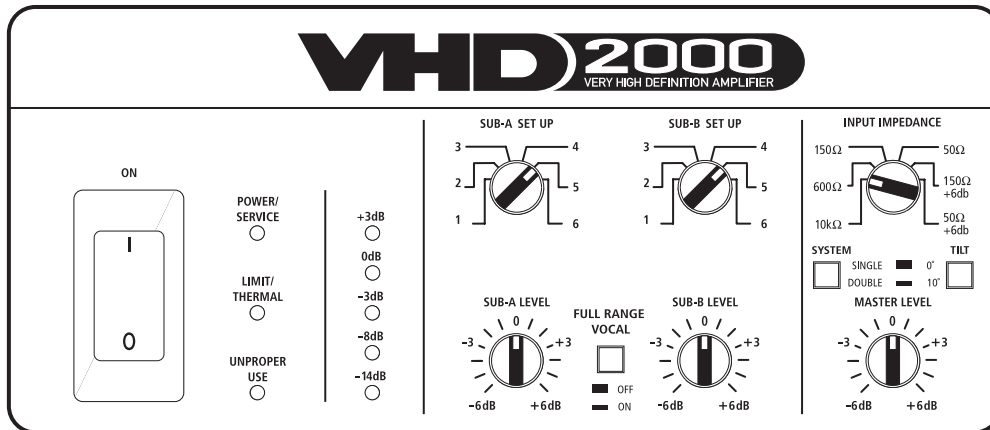
FRONT PANEL VHD 2000 SETUP



RECOMMENDED ENCLOSURE COMBINATIONS

SUB SETTING 5

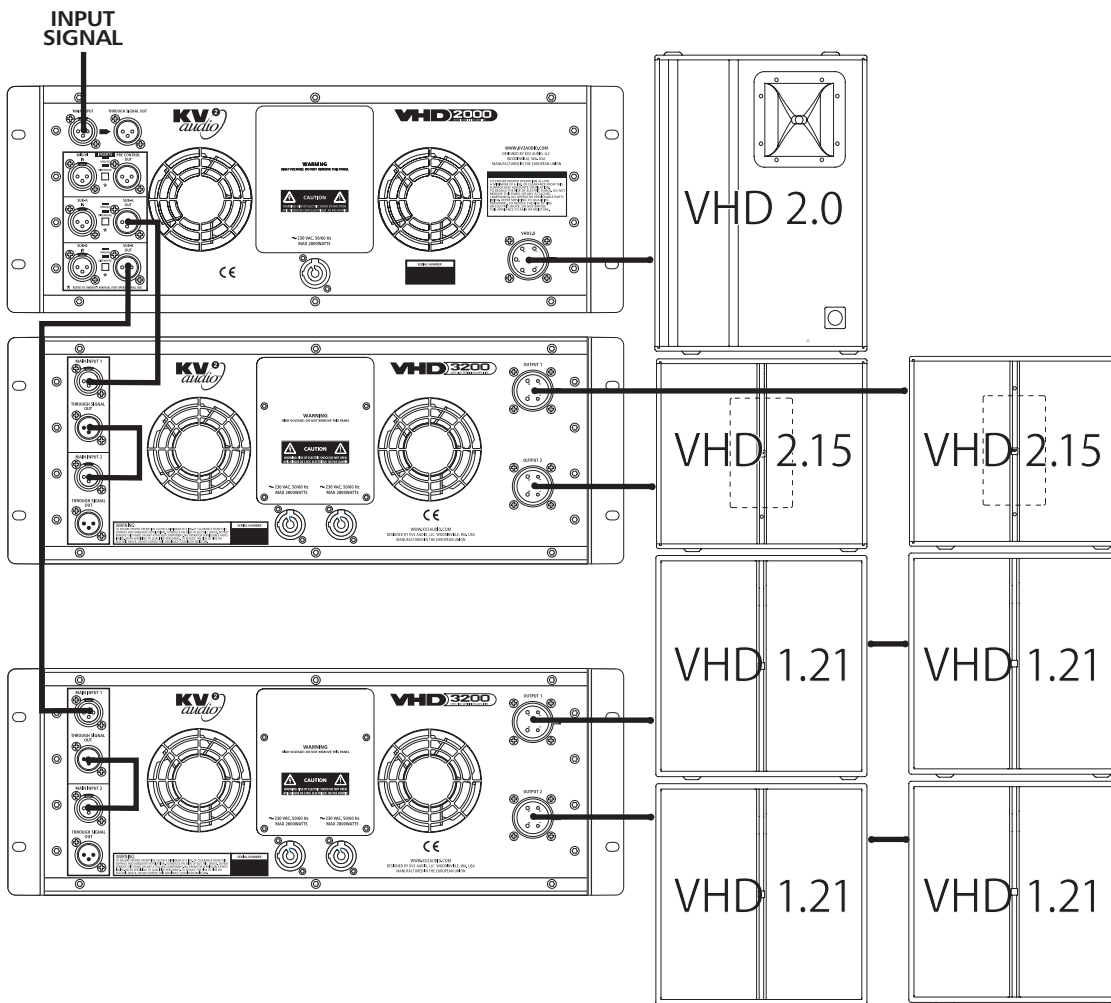
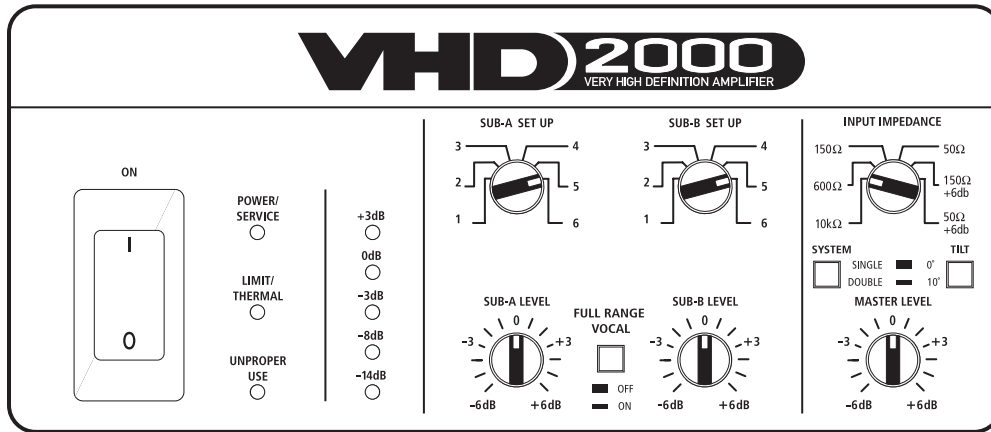
FRONT PANEL VHD 2000 SETUP



RECOMMENDED ENCLOSURE COMBINATIONS

SUB SETTING 6

FRONT PANEL VHD 2000 SETUP



WARRANTY, SERVICE & CONTACT INFORMATION

WARRANTY

Your VHD 2000 is covered against defects in material and workmanship. Refer to your supplier for more details.

SERVICE

In the unlikely event that your VHD 2000 develops a problem, it must be returned to an authorized distributor, service centre or shipped directly to our factory. Because of the complexity of the design and the risk of electrical shock, all repairs must be attempted only by qualified technical personnel.

If the unit needs to be shipped back to the factory, it must be sent in its original carton. If improperly packed, the unit may be damaged.

To obtain service, contact your nearest KV2 Audio Service Centre, Distributor or Dealer.

CONTACT INFORMATION

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